

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Improvements in the Production of Staple Yarns from Continuous Filaments

5 We, T.M.M. (RESEARCH) LIMITED, of Hartford Works, Oldham, Lancashire a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 With the object of providing an improved apparatus for the production of staple yarn from a tow of continuous filamentary material, the invention proposes to feed the tow continuously through a zone defined by the nips of spaced pairs of cooperating pressure elements, the first such pair of elements tending to retain the tow and the second pair, being driven at a superficial speed exceeding that of the first pair, subjecting the tow to tension in said zone and to provide in said zone an intermediate pair of cooperating members having surfaces moving in the same direction as the tow at a superficial speed excess of that of the first-mentioned pair of pressure elements, said intermediate members being pressed together lightly to provide "slip" or  
15 "soft nip" conditions by which a controlling effect is exercised on the tow passing between them, such that stresses occurring in the constituent filaments result in breakages thereof predominantly in the region between the nip of the first pair of pressure elements and said intermediate members.

20 The apparatus may be arranged so that the tow follows a substantially straight path through the aforementioned zone, or means may be provided for deflecting such path through a moderate degree, say up to 30°, by a suitable normal displacement of the intermediate members.

25 If necessary, e.g. when processing a heavy tow, a drafting stage may follow the passage of the material through the nip of the second pair of pressure elements.

[Price 3s. 6d.]

One embodiment of the invention is illustrated diagrammatically in the accompanying drawing, to which drawing reference is made in the following description. 45

The apparatus shown in the drawing comprises essentially three pairs of rollers, namely the input rollers A, B; the intermediate rollers C, D; and the output rollers E, F. The roller pairs A, B and E, F are heavily pressed together by suitable weighting means, indicated by the arrows X and Y, and the intermediate pair C, D are pressed together lightly, as denoted by the dotted arrow Z. The path of the tow is indicated by the line PQ, and it will be seen that the tow is firmly gripped at AB and EF. 50

The lower rollers of pairs A, B and E, F are both positively driven to propel the tow in the direction P-Q, and by reason of the fact that the superficial speed of the output rollers E, F is greater than that of the input rollers A, B, the tow is subjected to a high degree of tension in the zone between the two gripping points AB and EF, such tension resulting in the rupture of the constituent filaments. 55

The bottom intermediate roller D is positively driven at a speed in excess of the speed of the rollers A, B and the upper intermediate roller C is caused to revolve at a similar speed through frictional contact with the companion bottom roller D or with the tow material passing between them. 70

The speed of the rollers E, F is slightly in excess of that of the intermediate rollers C, D. The stresses generated in the tow between the back rollers A, B and the slip or intermediate rollers C, D substantially exceed those between the slip or intermediate rollers C, D and the front rollers E, F, so that the breakage of the filaments resulting from the frictional conditions of the slip rollers C, 75 80

D is constrained for the most part to occur in the region between the rollers A, B and the slip rollers C, D.

- 5 Means may be provided for adjusting the position of the intermediate rollers C, D, towards and away from the front rollers E, F, and/or in a direction normal to the direct path between the rollers A, B and E, F. In the latter case such adjustment permits the  
10 tow to be deflected through an angle which may thus be varied as required.

- 15 If desired, the intermediate roller D may be furnished with an apron, as indicated at G. Or both the rollers C, D may have aprons arranged to cooperate in controlling the passage of the ruptured filaments towards the output rollers E, F.

- 20 Means may also be provided for spreading or effecting a lateral separation of the filaments which compose the tow before the latter enters the nip of the rollers A, B. Such means may take the form of a rotary bladed beater wheel H arranged to impart an intermittent beating action on one side of the tow, or it may be a  
25 knife-edge disposed athwart the tow and adapted to be reciprocated against the underside of the tow to make intermittent contact therewith.

- 30 The tow may be unwound from a package and taken through slotted guides and over and around an assemblage of spaced fixed rods J, K before it enters the nip of the rollers A, B, said guides being adjustable in any direction and adapted to be disposed in such position  
35 that as the tow is unwound from top to bottom of the package and *vice versa* at each traverse, it will move up and down the guide-slot; due to such an arrangement the tow is traversed slightly as it passes over the aforementioned  
40 spaced rods J, K and thereby opened out laterally.

#### WHAT WE CLAIM IS:—

- 45 1. Apparatus for producing a staple yarn from a tow of continuous filamentary material, wherein the tow is fed continuously through a zone defined by the nips of spaced pairs of cooperating pressure elements, the first of such pair of elements tending to retain the tow

and the second operating to forward the tow at a speed exceeding that of the first pair, thereby subjecting the tow to tension in said zone, and wherein said zone includes an intermediate pair of cooperating members effective to forward the tow at a speed in excess of that of the first-mentioned pair of pressure elements, said intermediate members being pressed together lightly to provide "slip" or "soft nip" conditions, as and for the purpose described.

2. Apparatus as claimed in Claim 1, wherein the tow follows a substantially straight path through said zone.

3. Apparatus as claimed in Claim 1, including variable means for deflecting the tow out of the direct path between the first and second pairs of pressure elements.

4. Apparatus as claimed in Claim 1, wherein the first and second pairs of pressure elements are pairs of rollers pressed heavily together and positively driven, the superficial speed of the second mentioned pair being greater than that of the first-mentioned pair.

5. Apparatus as claimed in Claim 1, wherein the intermediate pair of cooperating members is a pair of rollers or a roller and an apron, or two aprons, pressed together lightly, one member of the pair being positively driven at a speed exceeding that of the first-mentioned pair of pressure elements but less than that of the second-mentioned pair of pressure elements.

6. Apparatus as claimed in Claim 1 or Claim 5, wherein the intermediate members are adjustable together towards or away from the first-mentioned pressure elements.

7. Apparatus as claimed in any of the preceding claims, comprising means, e.g. a rotary bladed beater wheel or a transversely disposed reciprocatory knife-edge, for effecting a spreading or lateral separation of the constituent filaments of the tow before the latter encounters the first-mentioned pair of pressure elements.

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#### PROVISIONAL SPECIFICATION

#### Improvements in the Production of Staple Yarns from Continuous Filaments

- 95 We, T.M.M. (RESEARCH) LIMITED, of Hartford Works, Oldham, Lancashire a British Company, do hereby declare this invention to be described in the following statement:—

- 100 With the object of providing an improved apparatus for the production of staple yarn from a tow of continuous filamentary material, the invention proposes to feed the tow continuously through a zone defined by the nips of spaced pairs of cooperating pressure elements, the first such pair of elements tending

to retain the tow and the second pair, being driven at a superficial speed exceeding that of the first pair, exercising a drawing action on the tow, and to provide in said zone an intermediate pair of cooperating members having surfaces moving in the same direction as the tow at a superficial speed in excess of that of the first-mentioned pair of pressure elements, said intermediate members being pressed together lightly to provide "slip" or "soft nip" conditions by which a controlling

effect is exercised on the tow passing between them, such that stresses occurring in the constituent filaments result in breakages thereof predominantly in the region between the nip of the first pair of pressure elements and said intermediate members.

The apparatus may be arranged so that the tow follows a substantially straight path through the aforementioned zone, or means may be provided for deflecting such path through a moderate degree, say up to  $30^\circ$ , by a suitable normal displacement of the intermediate members.

If necessary e.g. when processing a heavy tow, a drafting stage may follow the passage of the material through the nip of the second pair of pressure elements.

In one embodiment of the invention, the two pairs of pressure members are constituted by pairs of rollers disposed one above the other, the upper roller in each case being heavily loaded to exert a high degree of pressure on the tow passing through the nip.

The intermediate members may likewise take the form of a pair of cooperating rollers disposed one above the other, the bottom roller being positively driven at a speed in excess of the speed of the back pressure rollers and the upper intermediate roller being caused to revolve at a similar speed through frictional contact with the companion bottom roller or with the tow material passing between them. Alternatively the intermediate elements may comprise either a roller cooperating with an apron or a pair of cooperating aprons.

The speed of the second pair of pressure members, i.e. the front pair of rollers, may be slightly in excess of that of the intermediate rollers. The stresses generated in the tow between the back rollers and the slip or intermediate rollers substantially exceed those

between the slip or intermediate rollers and the front rollers, so that the breakage of the filaments resulting from the frictional conditions of the slip rollers is constrained for the most part to occur in the region between the back rollers and the slip rollers.

Means may be provided for adjusting the position of the intermediate rollers towards and away from the front rollers, and/or in a direction normal to the direct path between the back and front rollers. In the latter case such adjustment permits variation of the angle through which the tow is deflected.

Means may also be provided for spreading or effecting a lateral separation of the filaments which compose the tow before the latter enters the nip of the back rollers. Such means may take the form of a rotary bladed beater wheel arranged to impart an intermittent beating-action on one side of the tow, or it may be a knife-edge disposed athwart the tow and adapted to be reciprocated against the underside of the tow to make intermittent contact therewith.

In another arrangement tow unwound from a package is taken through slotted guides and over and around an assemblage of spaced fixed rods before it enters the nip of the back rollers, said guides being adjustable in any direction and adapted to be disposed in such position that as the tow is unwound from top to bottom of the package and *vice versa* at each traverse, it will move up and down the guide-slot; due to such an arrangement the tow is traversed slightly as it passes over the aforementioned spaced rods and thereby opened out laterally.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale.*

